

FORM PTO-1390 (Modified) (REV 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 216823US0XPCT
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 10/009483
INTERNATIONAL APPLICATION NO. PCT/JP99/03148	INTERNATIONAL FILING DATE 14 JUNE 1999	PRIORITY DATE CLAIMED NONE		
TITLE OF INVENTION PROCESS FOR PRODUCING FUNCTIONAL BREAD CRUMBS				
APPLICANT(S) FOR DO/EO/US Atsushi OKADA, et al.				
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:				
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below. 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ul style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ul style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). 12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). <p style="text-align: right;"><i>[Signature]</i></p>				
Items 13 to 20 below concern document(s) or information included: <ol style="list-style-type: none"> 13. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 15. <input type="checkbox"/> A FIRST preliminary amendment. 16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 17. <input type="checkbox"/> A substitute specification. 18. <input type="checkbox"/> A change of power of attorney and/or address letter. 19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825. 20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 22. <input type="checkbox"/> Certificate of Mailing by Express Mail 23. <input checked="" type="checkbox"/> Other items or information: 				
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U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 10/009483	INTERNATIONAL APPLICATION NO. PCT/JP99/03148	ATTORNEY'S DOCKET NUMBER 216823US0XPCT		
24. The following fees are submitted:		CALCULATIONS PTO USE ONLY		
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :				
<input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00				
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$890.00		
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).		<input type="checkbox"/> 20 <input type="checkbox"/> 30 \$0.00		
CLAIMS		NUMBER FILED	NUMBER EXTRA	RATE
Total claims	7	- 20 =	0	x \$18.00 \$0.00
Independent claims	2	- 3 =	0	x \$84.00 \$0.00
Multiple Dependent Claims (check if applicable).			<input checked="" type="checkbox"/>	\$280.00
TOTAL OF ABOVE CALCULATIONS =		\$1,170.00		
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.		\$0.00		
		SUBTOTAL =	\$1,170.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).		<input type="checkbox"/> 20 <input type="checkbox"/> 30 +	\$0.00	
		TOTAL NATIONAL FEE =	\$1,170.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).		<input type="checkbox"/>	\$0.00	
		TOTAL FEES ENCLOSED =	\$1,170.00	
		Amount to be: refunded	\$	
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NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.				
SEND ALL CORRESPONDENCE TO: <div style="display: flex; align-items: center;"> <div style="flex: 1;">  22850 </div> <div style="flex: 2; text-align: right;">  Surinder Sachar NAME 24,618 REGISTRATION NUMBER Dec. 13 2001 DATE </div> </div>				
<p>(703) 413-3000</p> <p style="text-align: center;">Surinder Sachar Registration No. 34,423</p>				

Description**Process for Producing Functional Bread Crumbs****Technical Field**

The present invention relates to a process for producing functional bread crumbs, and more particularly to a process for producing functional bread crumbs which readily and reliably adhere to a food ingredient even when the crumbs are applied directly thereto, and when the food ingredient coated with the crumbs is deep-fried in oil, the resultant coating assumes an appropriate color, a crispy texture with tenderness (hereinafter tenderness in this context will be referred to as "*sakumi*"), and a favorable flavor, and when the food ingredient is meat, the juicy (i.e., tender and tasteful) texture of the meat is maintained.

Background Art

Deep-fried foods (hereinafter called "deep-frieds") are produced through cooking at high temperature by use of a large amount of oil. During deep-frying, a food ingredient is heated to its core within a short period of time, and therefore loss of nutrients is relatively small. Deep-frieds are a type of foods favored by many people, since they assume a taste of oil or fat and an appetizing flavor. Among deep-frieds, cutlet is produced typically through the following process: flour is applied to raw meat, such as pork, beef, or

chicken (this step is called "*uchiko*"); the resultant meat is dipped in beaten egg; dried bread crumbs are caused to adhere to the dipped meat; and the meat covered with the crumbs is deep fried in oil.

However, the aforementioned process including *uchiko*, dipping in beaten egg, and adhesion of dried bread crumbs is troublesome. Therefore, studies have been carried out on bread crumbs which can be caused to adhere sufficiently to a food ingredient without requiring *uchiko* and dipping in beaten egg. For example, the below-described techniques are already known.

A batter mixture for deep-frying containing bread crumbs and one or more species selected from among highly cold-water-swellable or cold-water-soluble natural paste, synthetic paste, gelatinized starch, dry egg white, and dry whole egg; preferably flour or starch; and if desired, seasonings, spices, etc. (Japanese Patent Application Laid-Open (*kokai*) No. 55-150870). A process for producing bread crumbs characterized in that a coating solution is sprayed onto bread crumbs while the bread crumbs are rotated and/or a fluidized bed of the bread crumbs is formed, and the resultant bread crumbs are dried to thereby allow a coating material to adhere to the bread crumbs (Japanese Patent Application Laid-Open (*kokai*) No. 8-228705).

However, in the technique disclosed in Japanese Patent Application Laid-Open (*kokai*) No. 55-150870, bread crumbs are merely mixed with powder of, for example, natural paste.

Therefore, since the bread crumbs and the powder are separated from each other in the batter mixture, the mixture cannot be caused to adhere sufficiently to meat. In addition, when the size of the bread crumbs is reduced for preventing such separation, a crispy texture with *sakumi* of the bread crumbs cannot be obtained after deep-frying. Meanwhile, in the case of the technique disclosed in Japanese Patent Application Laid-Open (*kokai*) No. 8-228705, since drying steps must be carried out twice, the process for producing bread crumbs becomes troublesome. In addition, since bread crumbs are soaked in a coating solution, the matrix structure of the bread crumbs is deformed, resulting in a hard texture of the bread crumbs after deep frying. Use of a large amount of gelatinized starch or paste induces an increase in viscosity, and lumps of bread crumbs are formed easily. Therefore, the amount of gelatinized starch or paste used is limited.

In view of the foregoing, an object of the present invention is to provide a process for producing functional bread crumbs which can be produced easily and which can be caused to adhere sufficiently to a food ingredient even when the crumbs are applied directly to the food ingredient, and after the food ingredient coated with the bread crumbs is deep-fried in oil, the resultant coating assumes excellent texture and color, and, when the food ingredient is meat, juicy texture of the meat can be maintained.

Disclosure of the Invention

The present inventors have performed extensive studies in order to attain the aforementioned object, and have found that when fresh bread crumbs are mixed with powdery starch and/or powdery protein, and the resultant mixture is dried to thereby cause the powdery starch and/or powdery protein to adhere to the bread crumbs, there can be produced functional bread crumbs which can be caused to adhere sufficiently to a food ingredient, without *uchiko* and dipping in beaten egg, even when the crumbs are applied directly to the food ingredient, and that after the food ingredient coated with the bread crumbs is deep-fried in oil, the resultant coating assumes excellent texture, color, and flavor, and, when the food ingredient is meat, juicy texture of the meat can be maintained. The present invention has been accomplished on the basis of this finding.

Accordingly, the present invention provides a process for producing functional bread crumbs comprising mixing fresh bread crumbs with powdery starch and/or powdery protein; and drying the resultant mixture to thereby cause the powdery starch and/or powdery protein to adhere to the bread crumbs.

The present invention also provides functional bread crumbs comprising bread crumbs, and powdery starch and/or powdery protein adhered thereto.

Best Mode for Carrying Out the Invention

In general, the term "bread crumbs" refers to dried

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bread crumbs. Dried bread crumbs are produced through, for example, the following process: flour, yeast, sugar, lard, etc. are mixed together, and the resultant mixture is fermented by means of, for example, a straight dough method, followed by baking at low temperature, cooling, pulverization, and drying. As used herein, the expression "fresh bread crumbs" refers to bread crumbs obtained before drying, which is the final step of the aforementioned process for producing dried bread crumbs. Such fresh bread crumbs contain water usually in an amount of 15-60 wt.%, preferably 25-50 wt.%. No particular limitation is imposed on the size of an individual fresh bread crumb, but the average crumb size is preferably 100 μm to 7 mm, more preferably 200 μm to 5 mm. As used herein, the term "average crumb (or particle) size" refers to central accumulative value as measured by use of Microtrac FSA.

Starch, protein, or sugar used in the present invention must assume a powdery form. The average particle size of the powder is preferably 20-500 μm , more preferably 40-100 μm . When the average particle size exceeds 500 μm , the powder adheres insufficiently to fresh bread crumbs, whereas when the average particle size is less than 20 μm , there arise problems, including generation of lumps of the powder during mixing with fresh bread crumbs, and dispersion of the powder during production of functional bread crumbs, which is not preferable.

Examples of the starch include potato starch, sweet

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potato starch, flour starch, cornstarch, waxy cornstarch, and gelatinized starch or modified starch thereof. These may be used singly or in combination of two or more species. Of these, water-soluble gelatinized starch is particularly preferred. Examples of the protein include egg proteins such as whole egg, egg yolk, egg white, and ovalbumin and ovoglobulin separated therefrom; milk proteins such as nonfat powdered milk, fat powdered milk, and whey protein; animal proteins such as gelatin and collagen; and vegetable proteins such as soybean protein and flour protein. These may be used singly or in combination of two or more species. Examples of the sugar include monosaccharides such as glucose and fructose; oligosaccharides such as sucrose, maltose, lactose, and stachyose; and polysaccharides such as syrup and starch sugar. These may be used singly or in combination of two or more species.

In the present invention, powdery starch and/or powdery protein must be caused to adhere uniformly to bread crumbs. Preferably, in addition to powdery starch and powdery protein, powdery sugar is caused to adhere to the bread crumbs. No particular limitation is imposed on the method for causing such powder to adhere to bread crumbs. Since fresh bread crumbs contain moisture on their surfaces, powdery starch, etc. can be caused to adhere to the fresh bread crumbs merely by mixing with the bread crumbs and stirring the mixture appropriately. When two or more species of powdery starch, powdery protein, and powdery sugar are caused to adhere to

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fresh bread crumbs, these are preferably mixed together uniformly in advance (hereinafter, a mixture obtained through uniform mixing of powdery starch and/or powdery protein, and, if desired, powdery sugar will be referred to as a "functional mixture"). In addition to the aforementioned powdery starch, powdery protein, and powdery sugar, if desired, powdery seasoning, powdery thickener, powdery surfactant, liquid or solid oil or fat, salt, colorant, perfume, spice, sweetening agent, etc. may be caused to adhere to fresh bread crumbs, so long as such additives do not impede the effects of the present invention.

On the basis of 100 parts by weight of fresh bread crumbs, the adhesion amount of a functional mixture is preferably 2-60 parts by weight, more preferably 5-60 parts by weight, much more preferably 10-60 parts by weight, most preferably 20-40 parts by weight. When the adhesion amount of the functional mixture is less than 2 parts by weight, the resultant functional bread crumbs tends to adhere insufficiently to meat, etc. In contrast, when the adhesion amount of the functional mixture exceeds 60 parts by weight, lumps are easily generated during production of functional bread crumbs, and the resultant bread crumbs tend to provide a hard texture after deep-frying. When powdery sugar is used, the incorporation amount of the powdery sugar is preferably 0.01-80 parts by weight, more preferably 2-80 parts by weight, much more preferably 20-50 parts by weight, on the basis of the total incorporation amount of powdery starch and/or

powdery protein (100 parts by weight). When the incorporation amount of the powdery sugar exceeds 80 parts by weight, depending on the type of the sugar, the resultant functional bread crumbs tend to become sticky.

Subsequently, fresh bread crumbs to which a functional mixture adheres are dried, to thereby produce the functional bread crumbs of the present invention. No particular limitation is imposed on the drying method, but hot-air drying is preferably carried out. Preferably, the fresh bread crumbs are dried uniformly while the bread crumbs are fluidized or rotated continuously. The water content of the functional bread crumbs is preferably 2-20 wt.%, more preferably 3-10 wt.%, in order to cause the bread crumbs to adhere sufficiently to meat, etc., and to obtain excellent texture, color, and flavor after deep-frying. In the thus-produced functional bread crumbs of the present invention, the amount of the functional mixture which adheres to 100 parts by weight of the bread crumbs is preferably 3-86 parts by weight, more preferably 7-86 parts by weight, much more preferably 14-86 parts by weight.

Examples

The present invention will next be described in more detail by way of Examples, which should not be construed as limiting the invention thereto.

Examples 1 through 5 and Comparative Examples 1 and 2 Functional bread crumbs were produced by use of

functional mixtures in which the formulation of powdery starch and/or powdery protein was varied.

In Example 1, powdery starch alone was used as a functional mixture, and in Example 5, powdery protein alone was used as a functional mixture. In Example 2, powdery starch (75 parts by weight) and powdery protein (25 parts by weight) were mixed together, and the resultant mixture was stirred uniformly, to thereby prepare a functional mixture. In each of Examples 3 and 4, the procedure of Example 2 was repeated, except that the amounts of powdery starch and powdery protein were changed as shown in Table 1, to thereby prepare a functional mixture. Subsequently, fresh bread crumbs (100 parts by weight) were mixed with each of the aforementioned functional mixtures (25 parts by weight), the resultant mixture was stirred uniformly, and the mixture was dried by use of a fluidized-bed drying apparatus until the water content of the mixture became 6 wt.%, to thereby produce functional bread crumbs. In Comparative Examples 1 and 2, the aforementioned fresh bread crumbs were dried until the water content of the bread crumbs became 6 wt.%, and the thus-dried bread crumbs were used.

Table 1

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Comp. Ex. 1	Comp. Ex. 2
Dried bread crumbs (parts by weight)	-	-	-	-	-	100	100
Fresh bread crumbs (parts by weight) ¹⁾	100	100	100	100	-	-	-
Functional mixture (parts by weight)	25	25	25	25	-	-	-
(Functional mixture formulation)							
Powdery starch (parts by weight) ²⁾	100	75	50	25	-	-	-
Powdery protein (parts by weight) ³⁾	-	25	50	75	100	-	-
Adhesion amount (g)							
Color of deep fried	6.0	5.6	5.6	5.6	5.6	3.8	5.7
Texture of coating	2.0	2.1	2.1	2.2	2.2	1.4	2.0
Texture of meat	4.3	4.2	4.2	4.2	4.0	3.2	4.2
	4.3	4.1	4.1	4.1	4.0	1.8	4.0

1) Fresh bread crumbs (product of Frystar) (water content: 40 wt.-%)

2) Cornstarch α (gelatinized starch derived from corn) (product of Matsutani Chemical Industry Co., Ltd.)

3) Dried egg white F-type (egg white powder) (product of Albstar)

TEST REPORT

Test Example 1 (evaluation of functional bread crumbs
of Examples 1 through 5 and Comparative Examples 1 and 2 when
used in chicken cutlet)

The above-produced functional bread crumbs or dried bread crumbs were applied directly to chicken breast (four pieces, 20 g each), and the amount of the bread crumbs which adhered thereto was measured. Subsequently, the resultant chicken breast was deep-fried in oil at 170°C for three minutes. The color of the deep fried, the texture of the coating, and the texture of the meat were evaluated on the basis of the below-described standards (Examples 1 through 5 and Comparative Example 1). In Comparative Example 2, chicken breast (four pieces, 20 g each) was subjected to *uchiko*, and dipped in beaten egg in a manner similar to that of a conventional method, followed by application of dried bread crumbs. After the amount of the bread crumbs which adhered to the chicken breast was measured, the chicken breast was deep-fried in oil in a manner similar to that described above, and the color of the deep fried, etc. were evaluated. The results are shown in Table 1. Each evaluation rating is represented by the average of ratings evaluated by 10 panelists (the same shall apply hereinafter).

Evaluation standards

Color of deep-fried

3: Suitable color, excellent

2: Adequate color, good

1: Slight color, poor

Texture of coating

- 5: Exceptional *sakumi* texture, excellent
- 4: Appropriate *sakumi* texture, good
- 3: Slightly poor *sakumi* texture, fair
- 2: Poor *sakumi* texture and slightly crunchy texture, poor

- 1: Very poor *sakumi* texture and crunchy texture, very poor

Texture of meat

- 5: Very rich juiciness and soft texture, excellent
- 4: Rich juiciness and soft texture, good
- 3: Slightly poor juiciness, fair
- 2: Poor juiciness and hard texture, poor
- 1: Very poor juiciness and very hard texture, very poor

As is apparent from Table 1, as compared with the case of the conventional method in which dried bread crumbs are applied to meat after the meat is subjected to *uchiko* and dipped in beaten egg, when the functional bread crumbs of the present invention are used, without a troublesome procedure including *uchiko* and dipping in beaten egg, the amount of the bread crumbs which adhere to meat is nearly equal to that of the dried bread crumbs which adhere to meat. In addition, the deep-fried obtained by use of the functional bread crumbs is similar to that obtained by use of the dried bread crumbs, in terms of color of deep-fried, texture of coating, and texture of meat.

Examples 6 through 13

Functional bread crumbs were produced by use of functional mixtures in which the incorporation amounts of powdery starch and/or powdery protein and powdery sugar were varied.

In Example 6, powdery starch (100 parts by weight) and powdery sugar (30 parts by weight) were mixed together, and the resultant mixture was stirred uniformly, to thereby prepare a functional mixture. In Examples 7 through 13, the procedure of Example 6 was repeated, except that the incorporation amounts of powdery starch, powdery protein, and powdery sugar were changed as shown in Table 2, to thereby prepare functional mixtures. Subsequently, functional bread crumbs were produced in a manner similar to that of Examples 1 through 5.

FOOD PROCESSING

Table 2

	Ex. 6	Ex. 7	Ex. 8	Ex. 9	Ex. 10	Ex. 11	Ex. 12	Ex. 13	Comp. Ex. 1	Comp. Ex. 2
Dried bread crumbs (parts by weight)	-	-	-	-	-	-	-	-	100	100
Fresh bread crumbs (parts by weight) ¹⁾	100	100	100	100	100	100	100	100	-	-
Functional mixture (parts by weight)	25	25	25	25	25	25	25	25	-	-
(Functional mixture formulation)										
Powdery starch (parts by weight) ²⁾	100	50	-	50	50	50	50	50	-	-
Powdery protein (parts by weight) ³⁾	-	50	100	50	50	50	50	50	-	-
Powdery sugar (parts by weight) ⁴⁾	30	30	30	2	20	45	60	80	-	-
Adhesion amount (g)	6.7	6.5	6.4	5.8	6.2	7.3	7.2	7.3	3.8	5.7
Color of deep-fried	2.1	2.4	2.6	2.2	2.4	2.6	2.6	2.6	1.4	2.0
Texture of coating	4.4	4.4	4.6	4.3	4.5	4.5	4.6	4.6	3.2	4.2
Texture of meat	4.3	4.4	4.5	4.2	4.6	4.7	4.6	4.7	1.8	4.0

1) Fresh bread crumbs (product of Frystar) (water content: 40 wt.%)

2) Cornstarch α (gelatinized starch derived from corn) (product of Matsutani Chemical Industry Co., Ltd.)

3) Dried egg white F-type (egg white powder) (product of Albstar)

4) Pineflow (dextrin) (product of Matsutani Chemical Industry Co., Ltd.)

Test Example 2 (evaluation of functional bread crumbs
of Examples 6 through 13 when used in chicken cutlet)

The functional bread crumbs produced in Examples 6 through 13 were used, and the amount of the bread crumbs which adhere to meat was measured in a manner similar to that of Test Example 1, followed by evaluation. The results are shown in Table 2 (including the results of Comparative Examples 1 and 2).

As is apparent from Tables 1 and 2, as compared with the case of Comparative Example 2 in which dried bread crumbs are applied through the conventional method, when powdery sugar is used, without a troublesome procedure, the amount of the functional bread crumbs which adhere to meat increases, and the deep-fried is improved in color, etc. After deep-frying, exfoliation and falling of the coating were not observed. The results show that such effects are obtained considerably when the amount of powdery sugar is 20-80 parts by weight on the basis of the total amount (100 parts by weight) of powdery starch and powdery protein (Examples 10 through 13).

Examples 14 through 20

Functional bread crumbs were produced by changing the incorporation amount of a functional mixture on the basis of the amount of fresh bread crumbs.

In Example 14, powdery starch (20 parts by weight), powdery protein (50 parts by weight), and powdery sugar (30 parts by weight) were mixed together, and the resultant

mixture was stirred uniformly, to thereby prepare a functional mixture. Subsequently, the functional mixture (3 parts by weight) was mixed with fresh bread crumbs (100 parts by weight), the resultant mixture was stirred uniformly, and the mixture was dried by use of a fluidized-bed drying apparatus until the water content of the mixture became 6 wt.%, to thereby produce functional bread crumbs. In Examples 15 through 20, the procedure of Example 14 was repeated, except that the incorporation amounts of the functional mixture and fresh bread crumbs were changed as shown in Table 3, to thereby produce functional bread crumbs.

Table 3

	Ex. 14	Ex. 15	Ex. 16	Ex. 17	Ex. 18	Ex. 19	Ex. 20	Comp. Ex. 1	Comp. Ex. 2
Dried bread crumbs (parts by weight)	-	-	-	-	-	-	-	100	100
Fresh bread crumbs (parts by weight) ¹⁾	100	100	100	100	100	100	100	-	-
Functional mixture (parts by weight)	3	10	20	30	40	50	60	-	-
(Functional mixture formulation)									
Powdery starch (parts by weight) ²⁾	20	20	20	20	20	20	20	-	-
Powdery protein (parts by weight) ³⁾	50	50	50	50	50	50	50	-	-
Powdery sugar (parts by weight) ⁴⁾	30	30	30	30	30	30	30	-	-
Adhesion amount (g)	5.0	7.9	9.3	8.9	8.3	7.6	7.3	3.8	5.7
Color of deep-fried	2.0	2.5	2.6	2.7	2.7	2.6	2.5	1.4	2.0
Texture of coating	4.0	4.5	4.6	4.5	4.3	4.1	3.8	3.2	4.2
Texture of meat	3.5	4.5	4.7	4.8	4.7	4.7	4.6	1.8	4.0

1) Fresh bread crumbs (product of Frystar) (water content: 40 wt. %)

2) Cornstarch α (gelatinized starch derived from corn) (product of Matsutani Chemical Industry Co., Ltd.)

3) Dried egg white F-type (egg white powder) (product of Albstar)

4) Pineflow (dextrans) (product of Matsutani Chemical Industry Co., Ltd.)

Test Example 3 (evaluation of functional bread crumbs
of Examples 14 through 20 when used in chicken cutlet)

The functional bread crumbs produced in Examples 14 through 20 were used, and the amount of the bread crumbs which adhere to meat was measured in a manner similar to that of Test Example 1, followed by evaluation. The results are shown in Table 3 (including the results of Comparative Examples 1 and 2).

In Examples 14 through 20, the amount of the functional bread crumbs which adhere to meat was large, and the color of the deep-fried, etc. were excellent. Particularly in Examples 15 through 19, without a troublesome procedure, there was obtained a deep-fried which was more excellent, in terms of adhesion amount of bread crumbs, color, etc. than that obtained in Comparative Example 2 in which dried bread crumbs are applied through the conventional method.

In Example 20, there was obtained a deep-fried which was more excellent than that of Comparative Example 2 in terms of adhesion amount of bread crumbs, the deep-fried being similar to that of Comparative Example 2 in terms of color, etc.

Industrial Applicability

According to the process of the present invention, there can be easily produced functional bread crumbs which can be caused to adhere sufficiently to meat, etc., without *uchiko* and dipping in beaten egg. After the meat coated with

the bread crumbs is deep-fried in oil, exfoliation and falling of the coating do not occur, the coating assumes excellent texture and color, and the juicy texture of the meat can be maintained.

Claims

1. A process for producing functional bread crumbs comprising mixing fresh bread crumbs with powdery starch and/or powdery protein; and drying the resultant mixture to thereby cause the powdery starch and/or powdery protein to adhere to the bread crumbs.
2. The process for producing functional bread crumbs according to claim 1, wherein the powdery starch and/or powdery protein in a total amount of 2-60 parts by weight are caused to adhere to 100 parts by weight of the fresh bread crumbs.
3. A process for producing functional bread crumbs according to claim 1, wherein, in addition to the powdery starch and/or powdery protein, powdery sugar is caused to adhere to the fresh bread crumbs.
4. The process for producing functional bread crumbs according to claim 3, wherein the powdery starch, powdery protein, and powdery sugar in a total amount of 2-60 parts by weight are caused to adhere to 100 parts by weight of the fresh bread crumbs.
5. The process for producing functional bread crumbs according to claim 3 or 4, wherein 0.01-80 parts by weight of the powdery sugar is mixed with 100 parts by weight of the powdery starch and powdery protein.
6. Functional bread crumbs comprising bread crumbs, and powdery starch and/or powdery protein adhered thereto.

Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明について請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者（下記の名称が複数の場合）であると信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

Process for Producing Functional Bread Crumbs

機能性パン粉の製造方法

上記発明の明細書は、

the specification of which

is attached hereto.

was filed on June 14, 1999

as United States Application Number or

PCT International Application Number

PCT/JP99/03148 and was amended on

(if applicable).

本書に添付されています。

1999年6月14日に提出され、~~米国出願番号または~~特許協定条約国際出願番号を_____とし、

(該当する場合) _____に訂正されました。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

Japanese Language Declaration

(日本語宣言書)

私は、米国法典第35編119条 (a) - (d) 項又は365条 (b) 項に基づき下記の、米国以外の國の少なくとも一ヵ国を指定する特許協力条約365 (a) 項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

Prior Foreign Application(s)

外国での先行出願

(Number) (番号)	(Country) (国名)
(Number) (番号)	(Country) (国名)

私は、第35編米国法典119条 (e) 項に基づいて下記の米国特許出願規定に記載された権利をここに主張いたします。



(Application No.) (出願番号)	(Filing Date) (出願日)
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私は、下記の米国法典第35編120条に基づいて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約365条 (c) に基づく権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第35編112条第1項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国提出日までの期間中に入手された、連邦規則法典第37編1条56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

(Application No.) (出願番号)	(Filing Date) (出願日)
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(Application No.) (出願番号)	(Filing Date) (出願日)
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私は、私自信の知識に基づいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じるところに基づく表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行なえば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Claimed 優先権主張

<input type="checkbox"/>	<input type="checkbox"/>
Yes はい	No いいえ
<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/>	<input type="checkbox"/>
Yes はい	No いいえ
<input type="checkbox"/>	<input type="checkbox"/>

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)
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I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Status: Patented, Pending, Abandoned) (現況 : 特許許可済、係属中、放棄済)

(Status: Patented, Pending, Abandoned) (現況 : 特許許可済、係属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration

(日本語宣言書)

委任状：私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。

(弁護士、または代理人の指名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)



022850

書類送付先

Send Correspondence to:



022850

直接電話連絡先：(名前及び電話番号)

Direct Telephone Calls to: (name and telephone number)

(703) 413-3000

単独発明者または第一の共同発明者の氏名 岡田 温 1-00		Full name of sole or first joint inventor Atsushi OKADA	
発明者の署名 <i>Atsushi Okada</i>	日付 Nov. 20, 2001	Inventor's signature	Date
住所 103-8544 日本国東京都中央区日本橋小網町 19-12 日清製粉株式会社内	Residence C/O Nissin Flour Milling Co., Ltd. 19-12, Nihonbashi-koami-cho, Chuo-ku, Tokyo 103-8544 JAPAN	<i>JPX</i>	
国籍 日本国	Citizenship JAPANESE		
郵便の宛先 住所に同じ	Post Office Address SAME AS ABOVE		
第二の共同発明者の氏名 福留 真一 2-00		Full name of second joint inventor, if any Shinichi FUKUDOME	
第二の共同発明者の署名 <i>Shinichi Fukudome</i>	日付 Nov. 20, 2001	Second joint Inventor's signature	Date
住所 356-8511 日本国埼玉県入間郡大井町鶴ヶ岡 5-3-1 日清製粉株式会社内	Residence C/O Nissin Flour Milling Co., Ltd. 3-1, Tsurugaoka 5-chome, Ohi-machi, Iruma-gun, Saitama 356-8511 JAPAN	<i>JPX</i>	
国籍 日本国	Citizenship JAPANESE		
郵便の宛先 住所に同じ	Post Office Address SAME AS ABOVE		

(第三以降の共同発明者についても同様に記載し、署名すること)

(Supply similar information and signature for third and subsequent joint inventors.)